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EXAMINER	
ELPENORD, CANDAL	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,619	BOER ET AL.	
	Examiner	Art Unit	
	Candal Elpenord	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *22 Decmber 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1. **Claims 1, 3, 4, 14, 16-17, 22-29 (co-pending Application 10/562619)** are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over **claims 1, 3-4, 16, 18-19, 24, 26-29** of U.S. Patent Application **10/562620**. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following

Co-pending Application 10/562619	**Instant Application 10/562620**
Claim 1. method for transmitting one or more training symbols in a multiple antenna communication system, said method comprising the step of: transmitting from a transmitter having N antennas at least one training symbol using at least one antenna, such that said at least one training symbol can be interpreted by a receiver having M antennas, where M is less than N.	1. A method for transmitting da multiple antenna communication s having N transmit antennas, said comprising the step of: transmit legacy preamble having at least long training symbol and at leas additional long training symbol of said N transmit antennas, whe sequence of each of said long tr symbols on each of said N transm antennas are orthogonal.
Claim 3. the method of claim 1, wherein said at least one training symbol is an 802.11 a/g training symbol.	Claim 3. The method of claim 1, said legacy preamble further com at least one SIGNAL field.
Claim 4. The method of claim 1, wherein said at least one training symbol comprises at least one long training symbol and at least one SIGNAL field.	Claim 4. The method of claim 1, wherein said legacy preamble is 802.11a/g preamble.
Claim 14. A transmitter in a multiple antenna communication system, comprising: N transmit antennas for transmitting at least one training symbol using at least	Claim 16. A transmitter in a mu antenna communication system, comprising: N transmit antennas transmitting a legacy preamble h at least one long training symbo at least one additional long tra symbol on each of said N transmi antennas, wherein each of said l

one antenna, such that said at least one training symbol can be interpreted by a receiver having M antennas, where M is less than N. Claim 15. The transmitter of claim 14, wherein said receiver is a SISO receiver. Claim 16. The transmitter of claim 14, wherein said at least one training symbol is an 802.11 a/g training symbol. Claim 17. The transmitter of claim 14, wherein said at least one training symbol comprises at least one long training symbol and at least one SIGNAL field. Claim 22. A method for receiving data on at least one receive antenna transmitted by a transmitter having a plurality of transmit antennas in a multiple antenna communication system, said method comprising the step of: receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver; and deferring for said indicated duration. Claim 23. The method of claim 22, wherein said method is performed by a SISO receiver. Claim 24. The method of claim 22, wherein said indication is transmitted in a SIGNAL field that complies with the 802.11	training symbols are orthogonal. Claim 18. The transmitter of cl wherein said legacy preamble fur comprises at least one SIGNAL fi Claim 19. The transmitter of cl wherein said legacy preamble is 802.11 a/g preamble. Claim 24. The transmitter of cl whereby a lower order receiver c interpret said transmitted data. Claim 26. A method for receivin on at least one receive antenna transmitted by a transmitter hav transmit antennas in a multiple communication system, said metho comprising the steps of: receivi legacy preamble having at least long training symbol and an indi of a duration of a transmission data, and at least one additiona training symbol on each of said transmit antennas, wherein a seq of each of said long training sy on each of said N transmit anten orthogonal, said legacy preamble transmitted such that said indic of a duration can be interpreted lower order receiver; and defer for said indicated duration. 27. The method of claim 26, whe said method is performed by a SI receiver. 28. The method of claim 26, whe said indication is transmitted i SIGNAL field that complies with 802.11 a/g standards.

a/g standards. Claim 25. The method of claim 24, wherein said SIGNAL field is diagonally loaded across said plurality of antennas. Claim 26. A receiver in a multiple antenna communication system having at least one transmitter having a plurality of transmit antennas, comprising: at least one receive antenna for receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver; and means for deferring for said indicated duration. Claim 27. The receiver of claim 26, wherein said method is performed by a SISO receiver. Claim 28. The receiver of claim 26, wherein said indication is transmitted in a SIGNAL field that complies with the 802.11 a/g standards. Claim 29. The receiver of claim 28, wherein said SIGNAL field is diagonally loaded across said plurality of antennas. Claim 38. A method for transmitting data in a multiple antenna communication system having N transmit antennas, said method comprising the step of: transmitting a legacy preamble having at least one long training	29. A receiver in a multiple an communication system having at l one transmitter having N transmi antennas, comprising: at least o receive antenna for receiving a preamble having at least one lon training symbol and an indicatio duration of a transmission of sa data, and at least one additiona training symbol on each of said transmit antennas, wherein a seq of each of said long training sy on each of said N transmit anten orthogonal, said legacy preamble transmitted such that said indication of a duration ca interpreted by a lower order rec and means for deferring for said indicated duration.

symbol and at least one additional long training symbol on each of said N transmit antennas, such that said training symbols can be interpreted by a receiver having M antennas, where M is less than N. Claim 39. The method of claim 38, wherein said legacy preamble further comprises at least one short training symbol. Claim 40. The method of claim 38, wherein said legacy preamble further comprises at least one SIGNAL field. Claim 41. The method of claim 38, wherein said legacy preamble is an 802.11 a/g preamble.	

2. **Claims 1, 3, 4, 14, 16-17, 22-29, 38-41** are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims **1, 3-4, 9, 16, 18-19, 24, 26-29** of U.S. Patent Application 10/562620 in view of Mody et al (US 7,269,127 B2) in further view of Murphy et al (7,203,245 B1).

Regarding claims 1, 3-4, 14, 16-17, 22-29, 38, the instant application shown above teaches all the subject matter of the co-pending application above with the exception of the following features: **regarding claims 1, 38** the at least one training symbol can be interpreted by a receiver having M antennas, where M is less than N,

regarding claim 4, the at least one training symbol comprises one long training symbol and at least one SIGNAL field, **regarding claim 5**, wherein the at least one training symbol comprises a plurality of sub carriers wherein each of the sub carriers are active on only one of the N antennas at a given time, **regarding claim 6**, the method, wherein the signal field indicates a duration that a receiver should defer until a subsequent transmission, **regarding claim 7**, the method ("system/method for providing preamble structure and transmitting signals", recited in col. 3, lines 21-34), wherein the at least one training symbol comprises a plurality of subcarriers (see "plurality of sub-carries", recited in col. 15, lines 54- col. 16, lines 23) and wherein the transmitting step further comprises the step of diagonally loading (fig. 1, Transmit Diversity Branches 22-1. 22-2, "directing signals to the to transmitter", recited in col. 5, lines 36- 45, fig. 4, "diagonal arrow", recited in col. 8, lines 50 –col. 9, lines 18) the subcarriers (fig. 4, see across the N antennas (fig. 1, plurality of antennas, Antennas 26-1, 26-2, recited in col. 5, lines 31-46), **regarding claim 9**, the method, wherein the duration is represented as a duration of the transmission , **regarding claim 10**, the method, wherein the duration is represented as a length of the transmission, **regarding claim 11**, the method, wherein the signal field indicates a number of the antennas in the multiple antenna communication system, **regarding claim 12**, the method, wherein the number of the antennas allows the multiple antenna communication system to be scalable, **regarding claim 13,** the method, wherein the number of the antennas allows a receiver to correlate channel coefficients with the corresponding transmit antennas.

However, Mody et al. in the same field of endeavor discloses the following features: **regarding claims 1, 38,** the at least one training symbol ('transmission of training symbol", recited in col. 7, lines 40-50) can be interpreted (fig. 1, Receiver Demodulator 16, "demodulation of received signals", recited in col. 5, lines 61- col. 6, lines 13) by a receiver (fig. 1, MIMO Receiver 16, recited in col. 5, lines 46-60) having M antennas (fig. 1, Receive Antennas 28-1,28-2, recited in col. 5, lines 46-60) where M is less than N (fig. 1, where the number of transmitters ("Q") and receivers ("L") are equal to a number greater than one or non-equal to each other, recited in col. 5, lines 46-60), **regarding claims 4,** Mody et al. discloses method ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34), wherein the at least one training symbol (fig. 6, Training Symbol 74, recited in col. 10, lines 50- col. 11, lines 67) comprises at least one long training symbol (fig. 6, Data Symbol 80, recited in col. 10, lines 50- col. 11, lines 67), **regarding claim 5,** Mody et al. discloses the method ("system/method for providing preamble structure and transmitting signals", recited in col. 3, lines 21-34) , wherein the at least one training symbol (fig. 7, Training Symbol, recited in col. 15, lines 54- col. 16, lines 5) comprises a plurality of subcarriers (see "plurality of sub-carries", recited in col. 15, lines 54- col. 16, lines 23) and wherein each of the subcarriers are active on only one of the N antennas (fig. 1, Communication System 10 with transmit antennas 26-1, 26-2, recited in col. 5, lines 31-45) at a given time, **regarding claim 6,** the method as described in above paragraph, **regarding claim 7,** the method ("system/method for providing preamble structure and transmitting signals", recited in col. 3, lines 21-34), wherein the at least one training

symbol comprises a plurality of subcarriers (see "plurality of sub-carries", recited in col. 15, lines 54- col. 16, lines 23) and wherein the transmitting step further comprises the step of diagonally loading (fig. 1, Transmit Diversity Branches 22-1. 22-2, "directing signals to the to transmitter", recited in col. 5, lines 36- 45, fig. 4, "diagonal arrow", recited in col. 8, lines 50 –col. 9, lines 18) the subcarriers (fig. 4, see across the N antennas (fig. 1, plurality of antennas, Antennas 26-1, 26-2, recited in col. 5, lines 31-46), **regarding claim 8,** the method ("method/system for transmitting signal/symbol", recited in col. 3, lines 21-34), whereby a lower order receiver (fig. 1, Receiver 28-2, recited in col. 5, lines 46-60) can interpret ("demodulate of received symbols during Q symbol periods", recited in col. 9, lines 45-60) the transmitted duration ("symbol periods", recited in col. 9, lines 45-60); **regarding claim 9**, the number of antennas (see above rejection), **regarding claim 12,** the method ("method/system for transmitting signal/symbol", recited in col. 3, lines 21-34), wherein the number of the antennas allows the multiple antenna communication system (fig. 1, MIMO Communication System 10, recited in col. 4, lines 39-52) to be scalable (see, the number of transmitting antennas "Q" and receiving antennas "L" can be greater or unequal to each other, recited in col. 5, lines 46-60-that clearly implies scalability in the MIMO communication system), **regarding claim 13**, the method ("method/system for transmitting signal/symbol", recited in col. 3, lines 21-34), wherein the number of the antennas (fig. 1, Antennas 26-1. 26-2, recited in col. 5, lines 31-45) allows a receiver (fig. 1, Receiver 16, recited in col. 11, lines 66- col. 11, lines 21) to correlate channel coefficients (see, "correlation technique" , "time synchronization, frequency synchronization, channel

parameter estimation as channel coefficients", recited in col. 11, lines 66 - col. 12, lines 21) with corresponding transmit antennas ("periodic calibration to the receiver to the transmitter through training symbols", recited in col. 7, lines 40-50). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features disclosed in the instant application by using the features as taught by Mody et al. in order to provide antenna diversity (See col. 3, lines 21-32 for motivation).

The Instant Application (10/562620) and Mody et al. discloses all the claimed limitation with the exception of being silent with respect to the following features: **regarding claim 4**, and at least one SIGNAL field, **regarding claim 9**, wherein the duration is represented as a duration of the transmission, **regarding claim 10**, wherein the duration is represented as a length of the transmission, **regarding claim 11,** wherein the SIGNAL field indicates a number of the antennas in the multiple antenna communication system, **regarding claim 40**, wherein the legacy preamble further comprises at least one SIGNAL field.

However, Murphy et al. in a similar field of endeavor discloses the following features: **regarding claim 4**, and at least one SIGNAL field (**fig. 1-2, see Training Symbols, and the "Signal Field 102, recited in col. 3, lines 28-46**), **regarding claim 6**, the SIGNAL field indicates (**fig. 1-2, see Training Symbols, and the "Signal Field 102, recited in col. 3, lines 28-46**) a duration ("symbol duration", recited in col. 3, lines 28-58) that a receiver should defer until a subsequent transmission (see "IEEE

820.11a/g standard-"timeline", recited in col. 3, lines 20-58), **regarding claim 9**, wherein the duration ("symbol duration", recited in col. 3, lines 28-58) and is represented as a duration of the transmission ("rate of the packet", "actual length of the data payload", recited in col. 3, lines 28-46), **regarding claim 10**, wherein the duration ("symbol duration", recited in col. 3, lines 28-58) is represented as a length of the transmission ("rate of the packet", "actual length of the data payload", recited in col. 3, lines 28-46), **regarding claim 11,** wherein the SIGNAL field (**fig. 1, Signal Field 102, recited in col. 3, lines 28-46**), **regarding claim 40**, wherein the legacy preamble (fig. 1, Preamble Symbol 101 that conforms with IEEE 802.11a/g", recited in col. 3, lines 28-46) further comprises at least one SIGNAL field **(fig. 1-2, see Training Symbols, and the "Signal Field 102, recited in col. 3, lines 28-46**). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features of the instant application with of Mody et al. by using features as taught by Murphy et al. in order to provide detection of received OFDM symbols so that reception quality can be improved (See col. 2, lines 3-20 for motivation).

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 1-3, 5, 7, 14-16, 18, 20, 38, 39, 41** are rejected under 35 U.S.C. 102(e) as being by anticipated by Mody et al (US 7,269,127 B2)

Regarding claim 1, Mody et al. discloses a method ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34) for transmitting (fig. 1, Communication System for transmitting training symbols", recited in col. 3, lines 21-32) one or more training symbols (fig. 6, plurality of training symbols", recited in col. 11, lines 27-47) in a multiple antenna communication system (fig. MIMO Communication System 10, recited in col. 4, lines 39-52), the method ("system for providing preamble structure and transmitting signals", recited in col. 3, lines 21-34) comprising the step of: transmitting from a transmitter (fig. 1, MIMO Antenna 14, recited in col. 5, lines 31-45) having N antennas (fig. 1, Communication System 10 with transmit antennas 26-1, 26-2, recited in col. 5, lines 31-45) at least one training symbol ("transmitting one training symbol", recited in col. 3, lines 40-54) using at least one antenna (fig. 1, Transmitter 26-1, "transmission of signals", recited in col. 5, lines 31-45) , such that the at least one training symbol ('transmission of training symbol", recited in col. 7, lines 40-50) can be interpreted (fig. 1, Receiver Demodulator 16, "demodulation of received signals", recited in col. 5, lines 61- col. 6, lines 13) by a receiver (fig. 1, MIMO Receiver 16, recited in col. 5, lines 46-60) having M antennas (fig. 1, Receive Antennas 28-1,28-2, recited in col. 5, lines 46-60) where M is less than N (fig. 1, where

the number of transmitters ("Q") and receivers ("L") are equal to a number greater than one or non-equal to each other, recited in col. 5, lines 46-60)

Regarding claim 2, Mody et al. discloses the method ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34), wherein the receiver (fig. 1 Receiver 16, recited in col. 5, lines 46-60) is a SISO receiver ("SISO communication system", recited in col. 3, lines 40-54, fig. 7, SISO training symbol , recited in col. 13, lines 29-39).

Regarding claim 3, Mody et al. discloses the method ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34), wherein the at least one training symbol is an 802.11 a/g training symbol ("IEEE 802.11a", recited in col. 3, lines 1-7).

Regarding claim 5, Mody et al. discloses the method ("system/method for providing preamble structure and transmitting signals", recited in col. 3, lines 21-34) , wherein the at least one training symbol (fig. 7, Training Symbol, recited in col. 15, lines 54- col. 16, lines 5) comprises a plurality of subcarriers (see "plurality of sub-carries", recited in col. 15, lines 54- col. 16, lines 23) and wherein each of the subcarriers are active on only one of the N antennas (fig. 1, Communication System 10 with transmit antennas 26-1, 26-2, recited in col. 5, lines 31-45) at a given time.

Regarding claim 7, the method ("system/method for providing preamble structure and transmitting signals", recited in col. 3, lines 21-34), wherein the at least

one training symbol comprises a plurality of subcarriers (see "plurality of sub-carries", recited in col. 15, lines 54- col. 16, lines 23) and wherein the transmitting step further comprises the step of diagonally loading (fig. 1, Transmit Diversity Branches 22-1. 22-2, "directing signals to the to transmitter", recited in col. 5, lines 36- 45, fig. 4, "diagonal arrow", recited in col. 8, lines 50 –col. 9, lines 18) the subcarriers (fig. 4, see across the N antennas (fig. 1, plurality of antennas, Antennas 26-1, 26-2, recited in col. 5, lines 31-46).

Regarding claim 38, a method for transmitting data ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34) in a multiple antenna communication system (fig. 1, Communication System for transmitting training symbols", recited in col. 3, lines 21-32) having N transmit antennas (fig. 1, Communication System 10 with transmit antennas 26-1, 26-2, recited in col. 5, lines 31-45), the method ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34) comprising the step of: transmitting ("transmitting signals", recited in col. 4, lines 53-65) a legacy preamble (fig. 6, Preamble Structure 70, "Enhanced Training Symbol 79", recited in col. 10, lines 50- col. 11-, lines 13, col. 7, lines 26-39-the preamble structure conforms with IEEE 802.11a/g standards) having at least one long training symbol (fig. 6, Training Symbol 74, recited in col. 10, lines 50-col. 11, lines 13) and at least one additional long training symbol (fig. 6, Training Symbols 74-which is 80, recited in col. on each (fig. 1, Transmitter 26-1, "transmission of signals", recited in col. 5, lines 31-45) of the N transmit antennas (fig. 1, Communication System 10 with transmit antennas 26-1, 26-2, recited in col. 5, lines 31-

45), such that the training symbols can be interpreted by a receiver having M antennas, where M is less than N. ('transmission of training symbol", recited in col. 7, lines 40-50) can be interpreted (fig. 1, Receiver Demodulator 16, "demodulation of received signals", recited in col. 5, lines 61- col. 6, lines 13) by a receiver (fig. 1, MIMO Receiver 16, recited in col. 5, lines 46-60) having M antennas (fig. 1, Receive Antennas 28-1,28-2, recited in col. 5, lines 46-60) where M is less than N (fig. 1, where the number of transmitters ("Q") and receivers ("L") are equal to a number greater than one or non-equal to each other, recited in col. 5, lines 46-60)

Regarding claim 39, The method ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34), wherein the legacy preamble (fig. 6, Preamble Structure 70, "Enhanced Training Symbol 79", recited in col. 10, lines 50- col. 11-, lines 13) further comprises at least one short training symbol (fig. 6, see "G as Guard Symbol as the short symbol", recited in col. 10, lines 50 –col. 11, lines 26).

Regarding claim 41, the method ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34), wherein the legacy preamble(fig. 6, Preamble Structure 70, "Enhanced Training Symbol 79", recited in col. 10, lines 50-col. 11-, lines 13) is an 802.11 a/g preamble ("IEEE 802.11a", recited in col. 3, lines 1-7).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. **Claims 4, 6, 8-13, 17, 19, 21,** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mody et al (US 7,269,127 B2) in view of Murphy et al (US 7,203,245 B1).

Regarding claims 4, Mody et al. discloses method ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34), wherein the at least one training symbol (fig. 6, Training Symbol 74, recited in col. 10, lines 50- col. 11, lines 67) comprises at least one long training symbol (fig. 6, Data Symbol 80, recited in col. 10, lines 50- col. 11, lines 67), **regarding claim 6,** the method as described in above paragraph, **regarding claim 8,** the method ("method/system for transmitting signal/symbol", recited in col. 3, lines 21-34), whereby a lower order receiver (fig. 1, Receiver 28-2, recited in col. 5, lines 46-60) can interpret ("demodulate of received symbols during Q symbol periods", recited in col. 9, lines 45-60) the transmitted duration ("symbol periods", recited in col. 9, lines 45-60); **regarding claim 12,** the method ("method/system for transmitting signal/symbol", recited in col. 3, lines 21-34), wherein the number of the antennas allows the multiple antenna communication system (fig. 1, MIMO Communication System 10, recited in col. 4, lines 39-52) to be scalable (see, the number of transmitting antennas "Q" and receiving antennas "L" can be greater or unequal to each other, recited in col. 5, lines 46-60-that clearly implies scalability in the MIMO communication system), **regarding claim 13**, the method ("method/system for transmitting signal/symbol", recited in col. 3, lines 21-34), wherein the number of the antennas (fig. 1, Antennas 26-1. 26-2, recited in col. 5, lines 31-45) allows a receiver (fig. 1, Receiver 16, recited in col. 11, lines 66- col. 11, lines 21) to correlate channel coefficients (see, "correlation technique" , "time synchronization, frequency synchronization, channel parameter estimation as channel coefficients", recited in col. 11, lines 66 - col. 12, lines 21) with corresponding transmit antennas ("periodic

calibration to the receiver to the transmitter through training symbols", recited in col. 7, lines 40-50).

Regarding claims 9-11, Mody discloses the method as described in above paragraph.

Mody et al. discloses all the claimed limitation with the exception of being silent with respect to the following features: **regarding claim 4**, and at least one SIGNAL field, **regarding claim 9**, wherein the duration is represented as a duration of the transmission, **regarding claim 10**, wherein the duration is represented as a length of the transmission, **regarding claim 11,** wherein the SIGNAL field indicates a number of the antennas in the multiple antenna communication system, **regarding claim 40**, wherein the legacy preamble further comprises at least one SIGNAL field.

However, Murphy et al. in a similar field of endeavor discloses the following features: **regarding claim 4**, and at least one SIGNAL field (**fig. 1-2, see Training Symbols, and the "Signal Field 102, recited in col. 3, lines 28-46**), **regarding claim 6**, the SIGNAL field indicates (**fig. 1-2, see Training Symbols, and the "Signal Field 102, recited in col. 3, lines 28-46**) a duration ("symbol duration", recited in col. 3, lines 28-58) that a receiver should defer until a subsequent transmission (see "IEEE 820.11a/g standard-"timeline", recited in col. 3, lines 20-58), **regarding claim 9**, wherein the duration ("symbol duration", recited in col. 3, lines 28-58) and is represented as a duration of the transmission ("rate of the packet", "actual length of the data payload", recited in col. 3, lines 28-46), **regarding claim 10**, wherein the duration

("symbol duration", recited in col. 3, lines 28-58) is represented as a length of the transmission ("rate of the packet", "actual length of the data payload", recited in col. 3, lines 28-46), **regarding claim 11,** wherein the SIGNAL field **(fig. 1, Signal Field 102, recited in col. 3, lines 28-46**) indicates a number of the antennas in the multiple antenna communication system, **regarding claim 40**, wherein the legacy preamble (fig. 1, Preamble Symbol 101 that conforms with IEEE 802.11a/g", recited in col. 3, lines 28-46) further comprises at least one SIGNAL field **(fig. 1-2, see Training Symbols, and the "Signal Field 102, recited in col. 3, lines 28-46**). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features of Mody et al. by using features as taught by Murphy et al. in order to provide detection of received OFDM symbols so that reception quality can be improved (See col. 2, lines 3-20 for motivation).

5. **Claims 22-29** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mody et al (US 7,269,127 B2) in view of Tzannes et al (US 2004/0047296 A1).

Regarding claim 22, Mody et al. discloses a method for receiving data ("method/system for transmitting signal/symbol", recited in col. 3, lines 21-34) on at least one receive antenna (fig. 1, Receiving Antenna 28-1, recited in col. 5, lines 46-60) transmitted by a transmitter (fig. 1, Transmitter 14, recited in col. 5, lines 3—45) having a plurality of transmit antennas (fig. 1, OFDM Antennas 26-1, 26-2, recited in col. 5, lines 31-45) in a multiple antenna communication system (fig. MIMO Communication System 10, recited in col. 4, lines 39-52), the method ("method/system for transmitting

signal/symbol", recited in col. 3, lines 21-34), **regarding claim 23**, the method ("system for providing and transmitting signals in the form of symbols", recited in col. 3, lines 21-34), wherein the receiver (fig. 1 Receiver 16, recited in col. 5, lines 46-60) is a SISO receiver ("SISO communication system", recited in col. 3, lines 40-54, fig. 7, SISO training symbol , recited in col. 13, lines 29-39); **regarding claim 24**, the method ("method/system for transmitting signal/symbol", recited in col. 3, lines 21-34), **regarding claim 25**, the method ("method/system for transmitting signal/symbol", recited in col. 3, lines 21-34).

Mody et al. discloses all the claimed limitation with the exception of being silent with respect to the following features: **regarding claim 22**, receiving an indication of a duration to defer until a subsequent transmission, the indication transmitted such that the indication can be interpreted by a lower order receiver; and deferring for the indicated duration, **regarding claim 24**, the method wherein the indication is transmitted in a Signal Field that complies with the 802.11a/g standards, **regarding claim 25**, the method where the Signal field is diagonally loaded across the plurality of antennas.

However, Tzannes et al. in a similar field of endeavor discloses the following features: **regarding claim 22**, receiving (fig. 5, Legacy Station 530, recited in paragraph 0064)an indication of a duration ("received of SIGNAL Field to determine packet duration and time required for packet transmission", recited in paragraph 0064) to defer ("deferring for communication", recited in paragraph 0053-the protocol mentioned is the IEEE 802.11a/g) until a subsequent transmission ("deferring for communication", recited

in paragraph 0053-the protocol mentioned is the IEEE 802.11a/g-defereing is part of the IEEE standard), the indication transmitted such that the indication ("received of SIGNAL Field to determine packet duration and time required for packet transmission", recited in paragraph 0064) can be interpreted ("determining communication parameters", recited in paragraph 0053) by a lower order receiver (fig. 2, Receiver 160, recited in paragraph 0037, lines 1-19); and deferring for the indicated duration ("the SIGNAL field is used to determine duration", recited in paragraphs 0064-0065), **regarding claim 24**, the method wherein the indication is transmitted in a Signal Field (fig. 4, SIGNAL Field , recited in paragraph 0066) that complies with the 802.11a/g standards ("IEEE 802.11a/g standards", recited in paragraph 0062), **regarding claim 25**, the method where the Signal field (fig. 4, SIGNAL Field , recited in paragraph 0066) is diagonally loaded (fig. 1,2, diagonal arrows, "bit loading constellations", recited in paragraph 0029, lines 1-10 and lines 22-25) (across the plurality of antennas (fig. 2, Transmitters 140, 240, recited in paragraph 0037, lines 1-19). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features of Mody et al. by using features as taught by Tzannes et al. in order to maximum transmission rate and to provide compatibility using the IEEE 802.11a/g (See paragraph 0007 for motivation).

6. **Claims 30-37** are rejected under 35 U.S.C. 103(a) as being unpatentable over Stuber et al (US 2003/007677 A1) in view of Walton et al (US 2003/0087673 A1).

Regarding claim 30, Stuber et al. discloses a method for communicating ("method/apparatus for transmitting preambles", recited in paragraph 0011, and pilot

symbols", recited in paragraph 0039, lines 1-8) in a multiple antenna communication system (fig. 1, MIMO Communication System 6, recited in paragraph 0027), the method comprising the step of: transmitting one or more symbols ("transmission of signals", recited in paragraph 0028, fig. 5, Training symbol 53, recited in paragraph 0050) from a transmitter (fig. 1, Transmitter 8, recited in paragraph 0029, lines 1-14) having N transmit branches (fig. 1, Transmit antennas 18, recited in paragraph 0030, see plurality of antennas as the branches), regarding claim 31-33, the method ("method/apparatus for transmitting preambles", recited in paragraph 0011, and pilot symbols", recited in paragraph 0039, lines 1-8), **regarding claim 31-33**, discloses the method as described in above paragraph.

Stuber et al. discloses all the claimed limitation with the exception of being silent with regard to the following features: **regarding claim 30**, obtaining feedback from at least one receiver indicating a performance for at least one of the N transmit branches; and adapting one or more parameters of the at least one of the N transmit branches, **regarding claim 31**, wherein the one or more parameters includes a number of active transmit branches, **regarding claim 32**, wherein the one or more parameters includes a modulation scheme for the at least one of the N transmit branches, **regarding claim 33**, wherein the one or more parameters includes an encoding rate for the at least one of the N transmit branches.

However, Walton et al. in a similar field of endeavor discloses the following features: **regarding claim 30**, obtaining feedback ("channel estimates for receive/transmit antenna", recited in paragraph 0039, lines 1-12) from at least one

receiver (fig. 5, Receive Antenna, recited in paragraph indicating a performance for at least one of the N transmit branches (fig. 1, N Transmit Antennas , recited in paragraph 0025) ; and adapting one or more parameters ("transmission parameters", recited in paragraph 0039, lines 12-23) of the at least one of the N transmit branches (fig. 1, N Transmit Antennas , recited in paragraph 0025), **regarding claim 31**, wherein the one or more parameters includes a number of active transmit branches ("active terminals", recited in paragraph 0040), **regarding claim 32**, wherein the one or more parameters includes a modulation scheme ("selection of the proper coding scheme and modulation scheme based on channel state information", recited in paragraph 0040) for the at least one ("each transmit antenna", recited in paragraph 0040) of the N transmit branches (fig. 1, N Transmit Antennas , recited in paragraph 0025), **regarding claim 33**, wherein the one or more parameters includes an encoding rate (fig. 4, "data rates", recited in paragraphs 0081-0083) for the at least one of the N transmit branches (fig. 1, N Transmit Antennas , recited in paragraph 0025). Therefore, it would have been to one of ordinary skill in the art at the time the invention was made to modify the features of Stuber et al. by using the features as taught by Walton et al. in order to provide scheduling of data transmissions and antenna assignments based measured characteristics (See paragraph 0009 for motivation).

Claims 34-37 are rejected for the same reasons as claims 30-33 since they have the same limitations.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Crawford et al (US 2003/0002471 A1), Ma et al (US 7, 223,625 B2), and Wallace et al (US 2002/0193146 A1) are cited to show methods and systems that are related to the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Candal Elpenord whose telephone number is (571) 270-3123. The examiner can normally be reached on Monday through Friday 7:30AM to 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Bin Yao can be reached on (571) 272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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